

What is claimed is:

1. A method for forming a glass body, the method comprising:
 - providing a glass aggregate;
 - 5 mixing the glass aggregate with a liquid to form a slurry;
 - casting the slurry in a mold to form a porous pre-form, the mold including a porous glass substrate; and
 - consolidating the porous pre-form into the glass body.
- 10 2. The method of claim 1, wherein the step of providing the glass aggregate includes forming soot particles as a by-product of a flame hydrolysis process.
3. The method of claim 1, wherein the step of providing glass aggregate further comprises:
 - forming soot particles as a by-product of a flame hydrolysis process;
 - 15 providing a coarse glass powder having the same composition as the soot particles, the coarse glass powder including glass particles that are, on average, larger than the soot particles; and
 - mixing the soot particles and the coarse glass powder.
- 20 4. The method of claim 1, further comprising the step of cleaning the porous pre-form to remove impurities.
5. The method of claim 4, wherein the porous pre-form is cleaned by applying a liquid or a gas while the pre-form is in the mold.
- 25 6. The method of claim 4, wherein the step of cleaning further comprises:
 - disposing the porous pre-form in a high temperature chlorine gas atmosphere, the high temperature being lower than a sintering temperature; and
 - treating the porous pre-form by allowing the chlorine gas to react with the impurities.
- 30 for a pre-determined time.
7. The method of claim 5, wherein the high temperature is between 700°C and 1100°C.

8. The method of claim 1, wherein the liquid includes ammonia hydroxide.
9. The method of claim 1, wherein the step of drying is performed by heating the porous pre-form to approximately 1000°C.
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10. The method of claim 1, wherein the step of casting comprises the step of providing a mold that includes a glass substrate.
11. The method of claim 1, wherein the step of casting includes pressure casting the slurry.
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12. The method of claim 11, wherein the step of pressure casting the slurry further comprises:
 - disposing the slurry in a mold apparatus, the mold apparatus including a mold and a water collection chamber;
 - adding a desiccant to the slurry; and
 - applying a vacuum to the slurry, the vacuum and desiccant acting in concert to transfer water from the mold to the water collection chamber.
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13. The method of claim 1, wherein the step of consolidating includes heating the porous pre-form to a temperature of 1600°C.
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14. The method of claim 13, wherein the step of consolidating includes heating the porous pre-form to a temperature of 1600°C for approximately ten minutes.
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15. The method of claim 1, wherein the step of heating includes sintering the porous pre-form.
16. The method of claim 15, wherein the step of sintering the porous pre-form is performed at a temperature above 1000°C.
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17. The method of claim 15, wherein the porous pre-form is sintered at a temperature of approximately 1400°C.

18. The method of claim 15, wherein the porous pre-form is sintered at a temperature of approximately 1500°C.
19. The method of claim 15, wherein the porous pre-form is sintered at a temperature of approximately 1650°C.
20. The method of claim 15, wherein the step of sintering further comprises:
 - disposing the porous pre-form in a high temperature chlorine gas atmosphere, the high temperature being lower than a sintering temperature; and
 - 10 treating the porous pre-form by allowing the chlorine gas to react with the impurities for a pre-determined time.
21. The method of claim 15, wherein the step of sintering is performed in a substantial vacuum.
- 15 22. The method of claim 15, wherein the step of sintering is performed in a helium atmosphere.
23. The method of claim 1, wherein the glass substrate is of the same composition as the glass aggregate.
- 20 24. The method of claim 1, wherein the glass aggregate includes glass soot, glass cullet, and glass pieces larger than the glass cullet;
- 25 25. The method of claim 1, wherein the step of casting is performed using a slip casting technique.
26. The method of claim 1, wherein the step of casting is performed using a ~~vacuum~~ casting technique.
- 30 27. The method of claim 1, wherein the step of casting is performed using a gel casting technique.

28. A method for forming a glass body, the method comprising:

providing a glass aggregate;
mixing the glass aggregate with a liquid to form a slurry;
pressure casting the slurry in a mold to form a porous pre-form; and
heating the porous pre-form to form a glass object.

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29. A method for forming a glass body, the method comprising:

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providing glass particles, the particles including relatively fine glass soot particles
mixed with relatively coarse glass particles;
mixing the glass particles with a liquid to form a slurry;
pressure casting the slurry in a mold to form a porous pre-form; and
heating the porous pre-form to form a glass object.

30. A method for forming a glass body, the method comprising:

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providing glass particles, the particles including relatively fine glass soot particles
mixed with relatively coarse glass particles;
mixing the glass particles with a liquid to form a slurry;
providing a mold having a porous glass substrate;
pressure casting the slurry in the mold to form a porous pre-form; and
consolidating the porous pre-form to form a glass object.

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31. The method of claim 30, wherein the mold is formed from glass soot particles as a by-product of a flame hydrolysis process, the glass soot particles being collected in a containment vessel to form a body, the body being partially sintered to form a least a portion of the mold.

32. A method for forming a glass body, the method comprising:

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providing a glass aggregate;
mixing the glass aggregate with a liquid to form a slurry;
pressure casting the slurry in a mold to form a porous pre-form;
disposing the porous pre-form in a chlorine gas atmosphere heated to a predetermined temperature, the chlorine gas reacting with the impurities for a pre-determined

time, whereby the impurities are vaporized and carried out of the porous pre-form; and

consolidating the porous pre-form to form a glass object.

5 33. The method of claim 32, wherein the step of consolidating includes heating the porous pre-form.

34. The method of claim 33, wherein heating the porous pre-form includes sintering the porous pre-form.

10 35. The method of claim 32, wherein the predetermined temperature is lower than a sintering temperature

36. A method for forming a glass body, the method comprising:

15 providing a glass particles, the particles including relatively fine glass soot particles mixed with relatively coarse glass particles; mixing the glass particles with a liquid to form a slurry; pressure casting the slurry in a mold to form a porous pre-form; disposing the porous pre-form in a chlorine gas atmosphere heated to a predetermined temperature, the chlorine gas reacting with the impurities for a pre-determined time, whereby the impurities are vaporized and carried out of the porous pre-form; and

20 consolidating the porous pre-form to form a glass object.

25 37. The method of claim 36, wherein the step of consolidating includes heating the porous pre-form.

38. The method of claim 37, wherein heating the porous pre-form includes sintering the porous pre-form.

30 39. The method of claim 36, wherein the predetermined temperature is lower than a sintering temperature

40. A method for forming a glass body, the method comprising:
providing a glass aggregate;
mixing the glass aggregate with a liquid to form a slurry;
casting the slurry in a mold to form a porous pre-form, the mold including a porous
5 glass substrate having the same composition as the glass aggregate; and
consolidating the porous pre-form into the glass body.

41. A method for forming a glass body, the method comprising:
10 forming soot particles as a by-product of a flame hydrolysis process;
mixing the soot particles with a liquid to form a slurry;
disposing coarse glass cullet in a mold;
vacuum casting the slurry in a mold to form a porous pre-form, the mold including a
porous glass substrate; and
consolidating the porous pre-form into the glass body.

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